

CHEMOTHERAPY FOR LEUKEMIA CHILDREN ON ELEVATED CREATININE UREUM LEVELS

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ABSTRACT

This study aims to determine urea and creatine levels before and after chemotherapy in childhood leukemia. The research method used in this research is Quasi Experiment Pretest-posttest research. The results of the study show that based on the univariate analysis that has been carried out, it is known that the highest age of children with leukemia is school age (6-12 years). The most common gender of childhood leukemia is male, and the most common type of childhood leukemia is Acute Lymphoblastic Leukemia (ALL). Meanwhile, in the bivariate analysis after the Wilcoxon test, the p-value of urea levels before and after chemotherapy was $0.808 > 0.05$, and the p-value of creatinine levels before and after chemotherapy was $0.1000 > 0.05$. In conclusion, there is no difference in urea and creatinine levels before and after chemotherapy in children with leukemia.

Keywords: Chemotherapy, Ureum Creatinine, Childhood Leukemia

INTRODUCTION

Childhood cancer is a rare disease that can cause emotional, physical and social problems for children and their families. Childhood cancer can occur in any organ or tissue of the body, and the most common types of cancer are leukaemia and brain tumours (Limratchapong et al., 2022; Shields et al., 2019). Leukaemia is a malignant blood cell disease characterised by abnormal white blood cells in the bone marrow or primary malignancy in the bone marrow, in children it accounts for 35% of childhood cancers, 80% are Acute Lymphoblastic Leukaemia (LLA) and 20% Acute Myeloblastic Leukaemia (LMA) (Hamed et al., 2022). Acute Lymphoblastic Leukaemia is a malignancy characterised by progressive infiltration of immature lymphoid cells from the bone marrow and lymphatic organs known as lymphoblasts. In Indonesia, there are currently about 80,000,000 children under the age of 15 years. It is estimated that there are approximately 3000 new paediatric LLA cases each year (Algiraigri et al., 2021; Brown et al., 2021; Pojoh et al., 2019).

Leukaemia is a malignancy that originates from genetic changes in one or many cells in the bone marrow. The growth of normal cells is suppressed when leukaemia cells multiply, causing clinical symptoms. This haematological malignancy is the result of a neoplastic process accompanied by impaired differentiation at various levels of haematopoietic stem cells resulting in progressive expansion of the malignant cell group in the bone marrow, then leukaemia cells circulate

systemically (Ford et al., 2022; Rubnitz & Kaspers, 2021).

Research conducted by Yang et al., (2021) shows that chemotherapy is the main treatment for cancer until the remission stage. Chemotherapy drug metabolites can damage kidney, ureter, and bladder cells, characterised by decreased bladder function. The potential for kidney damage varies according to the type of chemotherapy drugs used, kidney damage due to the use of chemotherapy drugs can be mild to severe, and can even cause kidney failure. therefore, it is necessary to check kidney function before chemotherapy and during the chemotherapy process to ensure that there is no previous kidney disease and see the effect of chemotherapy drugs on the kidneys of children (Karol et al., 2020; Thastrup et al., 2022).

Based on the description above, a study was conducted to determine the characteristics of leukaemia children and the types of leukaemia suffered by children treated at DR. Wahidin Sudirohusodo Hospital Makassar and to determine the difference in creatinine urea levels before and after chemotherapy in patients with leukaemia children treated at DR. Wahidin Sudirohusodo Hospital Makassar for the period January - December 2021.

RESEARCH METHODS

This study was conducted at the Central General Hospital DR. Wahidin Sudirohusodo Makassar from October to December 2022 using a retrospective cohort research design. Data collection was carried out retrospectively, namely by collecting medical records of leukemia children at DR Wahidin Sudiro Husodo Hospital for the period January - December 2021 and then looking at and analysing the comparison of ureum and creatinine levels before and after chemotherapy in leukemia children.

Sampling in this study used a non-probability sampling technique with a purposive sampling approach, namely sampling based on consideration and in accordance with the inclusion criteria and exclusion criteria. The sample size was determined using the Issaac and Michael formula and obtained a sample size of 79 medical records of patients with leukaemia children. This study has received ethical approval recommendations from the research ethics commission of the Faculty of Medicine and Health Sciences, Muhammadiyah University of Makassar no. 211/UM.PKE/XI/44/2022.

Data analysis consisted of univariate analysis to see the characteristics of subjects including age, gender and types of leukaemia in children, while bivariate analysis to see the relationship of chemotherapy for leukaemia children to the increase in creatinine urea levels was carried out *Saphiro-Wilk* normality test, from the results of the normality test it was found that the data was not normally distributed so to see the effect of chemotherapy for leukaemia children on the difference in creatinine urea levels before and after chemotherapy, a hypothesis significance test was carried out using the *Wilcoxon-test*.

RESULTS

The research was conducted from 28 September to 15 December 2022 at the Central General Hospital DR Wahidin Sudirohusodo Makassar. The data that has been obtained is then input into the computer using excell. Furthermore, coding was carried out for each characteristic of the subject / independent and dependent

variables. After coding, the data was then input into SPSS 24 and then processed in the SPSS 24 application after categorising the variables. The data processing was started by looking at the characteristics of respondents in the form of age, gender, ureum creatinine examination results found with univariate analysis, then continued by looking at the relationship between the independent and dependent variables, in this case the relationship between chemotherapy and ureum creatinine with bivariate analysis.

Table. 1
Subject Characteristics Based on Age, and Leukemia Type

Characteristics	Frequency	Percentage	Total percentage
Todler	16	20,3	20,3%
Pre-school	17	21,5	21,5%
School	36	45,6	45,6%
Teenagers	10	12,7	12,7%
Total	79	100	100%

Table 1 shows the characteristics of respondents based on age group. Where it can be seen that school age (6-12) years is the most age that has leukaemia, namely 36 people. and the least age of adolescence is 10 people.

Table. 2
Subject Characteristics Based on Gender

Gender	Frequency	Percentage	Total Percentage
Male	48	60,8	60,8 %
Female	31	39,2	39,2 %
Total	79	100	100%

Table 2 shows the characteristics of respondents based on gender. Males were more likely to experience leukaemia, namely 48 respondents (60.8%), while females were 31 respondents (39.2%).

Table. 3
Characteristics of Subjects Based on Leukemia Type

Types of Leukaemia	Frequency	Percentage	Total (%)
Acute Lymphoblastic Leukemia	69	87,3	87,3%
Acute Non Lymphoblastik Leukemia	8	10,1	10,1%
Cronik Myelositic Leukemia	1	1,3	1,3%
Acute Myeloid Leukemia	1	1,3	1,3%
Total	79	100	100%

Table 3 shows the types of leukaemia in children. The most common leukaemia was acute lymphoblastic leukaemia (LLA) with 63 people (87.3%), and the least was chronic myelocytic leukaemia and acute myeloid leukaemia with 1 person each (1.3%).

Table. 4
Leukaemia Chemotherapy and Creatinine Ureum Levels

	Ureum Posttest-Pretest	Kreatinin Posttest-Pretest
Z	-.243	.000 ^c
Asymp. Sig. (2-tailed)	.808	1000

The results of statistical testing after the normality test with the Sapihiro Wilk Test, found that the data was not normally distributed so that the Wilcoxon-test above was obtained p value for pre-post ureum $0.808 > 0.05$ and p value for pre-post creatinine $1.000 > 0.05$ which can be concluded that there is no difference in ureum and creatinine values before and after chemotherapy, and it can also be concluded that there is no increase in ureum and creatinine values after chemotherapy in leukaemia children.

DISCUSSION

Child leukaemia is more common in school-aged children. Compared to other cancers such as lung cancer and breast cancer, leukaemia is a rare cancer. However, leukaemia is the most common type of cancer found in children under the age of 15. Some of the influencing factors are genetic predisposition, environmental factors where exposure to certain harmful substances or radiation can affect the development of leukaemia in children, and the immune system that is still developing in school-age children. (Limratchapong et al., 2022; Nuraini & Mariyam, 2020).

Based on gender, it was found that males were more likely to experience leukaemia in children. This is in line with research conducted by M'Harzi and Tarigan on the prevalence and characteristics of acute lymphoblastic leukaemia children at Sanglah Denpasar General Hospital and several other studies internationally and nationally found that LLA patients were more likely to be male than female (M'harzi et al., 2022). This gender difference affects prognosis, with males having a worse prognosis than females. This is because in men, testicular involvement can occur in 10-23% of cases (Ballo et al., 2021).

The prevalence of leukaemia type is more Acute Lymphocyte Leukaemia type, this is in line with the statement of the Indonesian Pediatric Association estimated that there are around 3000 new cases of LLA children every year (Nuraini & Mariyam, 2020). Leukaemia is a malignancy that originates from genetic changes in one or many cells in the bone marrow. The growth of normal cells is suppressed when leukaemia cells multiply, causing clinical symptoms. This haematological malignancy is the result of a neoplastic process accompanied by impaired differentiation at various levels of haematopoietic stem cells resulting in progressive expansion of the malignant cell group in the bone marrow, then leukaemia cells circulate systemically (Ford et al., 2022; Rubnitz & Kaspers, 2021).

Based on the results of data analysis in the bivariate test, it was found that there was no increase in creatinine urea levels after leukemia chemotherapy in children. The results of this study are in line with research conducted by Djoko Heri Hermanto who obtained the results of the Wilcoxon test which found no significant increase in pre and post chemotherapy BUN levels (Hermanto et al., 2021; Hoeben et al., 2022). In several studies on the picture of kidney function

with acute lymphoblastic leukaemia therapy, it was seen that the picture of kidney function in children with lymphoblastic leukaemia therapy in the high risk group and the standard risk group after undergoing consolidation phase chemotherapy had no significant difference. In a cohort study, it was found that acute kidney injury during chemotherapy occurred in children aged over 10 years and with severe sepsis in patients with acute myeloid leukaemia (Lam et al., 2023).

Renal complications that occur in patients with LLA are often attributed to several factors, namely the infiltration of leukaemia cells into the kidney cells and also due to the effect of treatment on the cancer cells themselves (Hermanto et al., 2021; Queudeville & Ebinger, 2021). Complications to the kidneys are not uncommon and mostly occur in the induction phase, and can last for several years or may even become permanent. A frequent complication is kidney enlargement caused by the infiltration of leukaemia cells into the kidney cells. In addition to kidney enlargement, acute kidney injury (acute renal failure) is also one of the severe renal complications due to LLA disease, although it is still rare (Vijayasekharan et al., 2021). Acute renal failure in childhood acute lymphoblastic leukaemia chemotherapy also occurs when high doses of methotrexate are given (Li et al., 2020).

CONCLUSION

Based on the frequency distribution of data on children with leukaemia at Dr Wahidin Sudirohusodo Hospital, the age data of children is mostly at school age. In gender, most were male compared to female. Based on the type of leukaemia, the most common leukaemia suffered by children is Acute Lymphoblastic Leukemia (ALL). Based on the bivariate analysis that has been done, it can be concluded that there is no increase in the value of ureum and creatinine pre and post chemotherapy of leukaemia in children.

SUGGESTION

It is necessary to conduct laboratory examinations immediately after chemotherapy and carried out to all paediatric patients who have undergone chemotherapy to continue to see the development of kidney function in leukaemia children undergoing chemotherapy. In addition, the chemotherapy protocol that has been established should still be followed.

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